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| 10/539,802 | 06/20/2005 | Martin Sohn | 272999US0PCT | 6799 |
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| OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314 | | | EXAMINER | |
| | | | BROOKS, CLINTON A | |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patentdocket@oblon.com
oblonpat@oblon.com
jgardner@oblon.com

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|------------------------------|--------------------------------------|------------------------------------|
| Office Action Summary | Application No. 10/539,802 | Applicant(s) SOHN ET AL. |
| | Examiner CLINTON BROOKS | Art Unit 4121 |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED. (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 08 April 2009.
- 2a) This action is FINAL. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1-20 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All b) Some * c) None of:
1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO/SB/08)
- Paper No(s)/Mail Date 1.
- 4) Interview Summary (PTO-413)
 Paper No(s)/Mail Date. _____.
- 5) Notice of Informal Patent Application
- 6) Other: _____.

DETAILED ACTION

Status of Claims

Claims 1-20 are currently pending.

Priority

The instant application, Application Serial No. 10/539802, filed June 20, 20005, is a filing under 35 U.S.C. 371 of International Application No. PCT/EP03/14184, filed December 13, 2003, claiming priority of German Patent Application GERMANY 102 60 082.1, filed December, 19, 2002.

Election/Restrictions

Applicant's specie election without traverse in the response received April 8, 2009 is acknowledged. In the response, Applicants' elected the species as follows:

- I. Applicants elect methylenediphenyl isocyanate (MDI) as the polyisocyanate.
- II. Applicants elect diphenylmethanediamine (MDA) as the organic amine.
- III. Applicants elect chlorobenzene as the solvent.

Claims 1-20 are examined in the instant application. After reconsideration, the species election is withdrawn and the full scope of all claims is examined in this action.

Information Disclosure Statement

The Examiner has considered all references from the IDS statement dated July 18, 2005 that have not been marked with a strikethrough.

Claim Objections

Claim 15 objected to because of the following informalities: The word "residence" is used twice. Appropriate correction is required.

Claim Rejections – 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

- (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claim 1-7, 10, 13 are rejected under 35 USC 102(a) as being unpatentable over WO03/045900. ("the '900 publication"), United States Patent no. 7084297 ("the '297 patent") is the English family member of the earlier published WO03/045900 publication. The instant rejection is based on WO03/045900, however, United States Patent No. 7084297 will be used to reference the teachings because it is in the English language.

The '297 patent teaches preparing at least one polyisocyanate by reacting a hexamethylenediamine with phosgene in an inert monochlorobenzene (example 1, column 7 lines 27 to 61). The '297 patent teaches at least 3 stages (figure 2, also figure 3), mixing apparatus (figure 2, element III; also figure 3 (1-5)), residence apparatus (reaction channel, figure 2, element IV; also figure 3 (6-7)), a purification stage where distillation takes place (example 1,

column 7, lines 45 to 50; also “[a]t the other end of the plate reactor, the gas stream is preferably focused in a collecting element and then fed to the working-up stage” (column 6, lines 50-54)), and the pressure in each successive stage being lower than the previous stage (example 1, lines 52 to 57; example 2).

Regarding claim 2, the ‘297 patent teaches hexamethylene diisocyanate (HDI) (example ; column 7 , lines 40 to 42).

Regarding claim 3, the ‘297 patent teaches “[a]fter mixing in the mixing unit, which, for example, may consist of a nozzle or a static mixer, the gaseous mixture comprising phosgene, amine and, if required, inert medium is transferred to the reaction channel” (column 6, lines 1 to 4).

Regarding claims 4, the ‘297 patent teaches “[a]suitable reactor block is, for example, an appropriately dimensioned tube in whose interior two or more reaction channels are arranged” (column 7, lines 4 to 7).

Regarding claim 5, the ‘297 patent teaches that the “average contact time is generally from 0.05 to 5 seconds, preferably from 0.06 to 1, particularly preferably from 0.1 to 0.45, second. Average contact time is understood as meaning the time span from the beginning of mixing of the starting material to washing-out of the reaction gas after leaving the reaction channel in the working-up stage” (column 5, lines 37 to 43).

Regarding claim 6, the ‘297 patent teaches that the process is carried out in a reactor block, the latter containing two or more, preferably from 2 to 20, reaction channels described above, preferably plate reactors” (column 6 to 7; lines 66 to 4).

Regarding claim 7, the '297 patent teaches that a scrubbing tower for removal of excess gases. Specifically, the '297 patent teaches that "excess phosgene, hydrogen chloride and any inert medium pass through the working stage in gaseous form" (column 6, lines 10 to 21).

Regarding claim 10, the '297 patent teaches the plate reactor embodiment wherein the first stage is integrated into the residence apparatus (column 6, lines 26 to 65).

Regarding claim 13, the '297 patent teaches "[t]he inert medium is a medium which is present in gaseous form at the reaction temperature and does not react with the starting materials. For example, nitrogen, noble gases, such as helium or argon, or aromatics, such as chlorobenzene, dichlorobenzene or xylene, may be used" (column 4 to 5, lines 64 to 2).

Claim Rejections – 35 USC § 102/103

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1- 2, 4, 7- 9, 11-13, 16-20 rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over United States Patent no. 2822373 ("the '373 patent").

Regarding claim 1, the '373 patent teaches preparing at least one polyisocyanate by reacting an organic amine with phosgene in an inert solvent (example 1; column 4 lines 3 to 47). The '297 patent teaches at least 3 stages (figure 1), mixing apparatus (figure 1, heater), residence apparatus (reservoir, figure 1), a purification stage where distillation takes place (figure 1, line going out of reservoir and through the condenser; also column 1, lines 42 to 53; also "[i]t is

preferred that the solvent have a lower boiling point than the particular isocyanate which is being prepared in order that the isocyanate will remain dissolved in the solution but can be readily removed therefrom by distillation of the solvent" (column 3, lines 42 to 59)), and the pressure in each successive stage being lower than the previous stage ("[t]he solution is then vented through a valve into the reservoir which is maintained at pressure much lower than that of the line and usually at substantially atmospheric pressure so that the hydrogen chloride and excess phosgene is flashed from the solution and carried off through a condenser" (column 2 lines 25 to 33)).

Regarding the pressure being reduced at the reaction column, it is inherent that pressure drop occurs along tubes. Thus, the pressure in each stage is lower than the previous stage.

Regarding claim 2, the '373 patent teaches various specific amines that can be used in the process (column 3, lines 64 to 70). For example the '373 patent teaches 2,4-tolylene diamine.

Regarding claim 4, the '373 patent teaches an unstirred residence apparatus (figure 1, "reservoir").

Regarding claim 7, the phosgene is separated off in a column fitted with a condenser (figure 1, line leading to condenser).

Regarding claim 8 and 9, the '373 patent teaches a throttle valve and valve in the solvent return line, and in addition the valve between the reservoir and the isocyanate solution of Figure 1. Specifically, the '373 patent teaches that "[i]t is preferred that the solvent have a lower boiling point than the particular isocyanate which is being prepared in order that the isocyanate will remain dissolved in the solution but can be readily removed therefrom by distillation of the solvent" (column 3, lines 42 to 59). Thus, distillation takes place on the other side of the valve.

Regarding claims 11, 18 and 19, the '373 patent teaches “[p]ressures of from 5 to 20 pounds per square inch gauge have been found to be satisfactory for carrying out the process of this invention, although higher pressures even up to 200 pounds may be employed if desired” (column 3, lines 11 to 14)”. It would have been prima facie obvious to one having skill in the art at the time the invention was made to use 3-70 bar because the '373 patent teaches that up to 200 pounds per square inch may be employed. According to MPEP 2144.05: In the case where the claimed ranges “overlap or lie inside ranges disclosed by the prior art” a prima facie case of obviousness exists. *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976).

Regarding claim 12, 20, the '373 patent teaches “[t]he temperature at which the reaction is carried out should be above the decomposition temperature of the intermediate carbamyl chloride formed by the reaction of phosgene with the amine. This temperature will range from 90 degrees Celsius to 180 degrees Celsius” (column 3, lines 27 to 32).

Regarding claim 13, the '373 patent teaches otho-dichlorobenzene (column 4, lines 1 to 12).

Regarding claims 16, 17, the '373 patent teaches valves (Figure 1, throttle valve).

Claim Rejections – 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

- (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claim 1-7, 10-15, 18-20 are rejected under 35 USC 103(a) as being unpatentable over WO03/045900. ("the '900 application"). United States Patent no. 7084297 ("the '297 patent") is the English family member of the earlier published WO03/045900 publication. The instant rejection is based on WO03/045900, however, for United States Patent No. 7084297 will be used to reference the teachings because it is in the English language.

The '297 patent teaches preparing at least one polyisocyanate by reacting a hexamethylenediamine with phosgene in an inert monochlorobenzene (example 1, column 7 lines 27 to 61). The '297 patent teaches at least 3 stages (figure 2, also figure 3), mixing

apparatus (figure 2, element III; also figure 3 (1-5)), residence apparatus (reaction channel, figure 2, element IV; also figure 3 (6-7)), a purification stage where distillation takes place (example 1, column 7, lines 45 to 50; also “[a]t the other end of the plate reactor, the gas stream is preferably focused in a collecting element and then fed to the working-up stage” (column 6, lines 50-54)), and the pressure in each successive stage being lower than the previous stage (example 1, lines 52 to 57; example 2).

Regarding claim 2, the ‘297 patent teaches hexamethylene diisocyanate (HDI) (example 1; column 7, lines 40 to 42).

Regarding claim 3, the ‘297 patent teaches “[a]fter mixing in the mixing unit, which, for example, may consist of a nozzle or a static mixer, the gaseous mixture comprising phosgene, amine and, if required, inert medium is transferred to the reaction channel” (column 6, lines 1 to 4).

Regarding claims 4, the ‘297 patent teaches “[a]suitable reactor block is, for example, an appropriately dimensioned tube in whose interior two or more reaction channels are arranged” (column 7, lines 4 to 7).

Regarding claim 5, 14, 15 the ‘297 patent teaches that the “average contact time is generally from 0.05 to 5 seconds, preferably from 0.06 to 1, particularly preferably from 0.1 to 0.45, second. Average contact time is understood as meaning the time span from the beginning of mixing of the starting material to washing-out of the reaction gas after leaving the reaction channel in the working-up stage” (column 5, lines 37 to 43).

The ‘297 patent failed to teach the second stage residence time of 20 seconds to 10 minutes, or 2 to 7 minutes.

However, it would have been *prima facie* obvious to one having ordinary skill in the art at the time the invention was made apply routine optimization of the reaction times presented in order to optimize the yield and conversion of the reaction. According to MPEP 2144.05: Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. “[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.” In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955)

Regarding claim 6, the '297 patent teaches that the process is carried out in a reactor block, the latter containing two or more, preferably from 2 to 20, reaction channels described above, preferably plate reactors” (column 6 to 7; lines 66 to 4).

Regarding claim 7, the '297 patent teaches that a scrubbing tower for removal of excess gases. Specifically, the '297 patent teaches that "excess phosgene, hydrogen chloride and any inert medium pass through the working stage in gaseous form" (column 6, lines 10 to 21).

Regarding claim 10, the '297 patent teaches the plate reactor embodiment wherein the first stage is integrated into the residence apparatus (column 6, lines 26 to 65).

Regarding claim 11, 18, 19, the '297 patent teaches that the reaction channel which is downstream of the mixing apparatus "consists of a material which is substantially inert to the phosgenation reaction. Furthermore, it should generally withstand pressures of up to 10, preferably 20, bar" (column 3, lines 45 to 51). The '297 patent is silent with respect to the pressure upstream of the mixing apparatus. However, one skilled in the art can infer from the teaching that the apparatus is designed to withstand pressures up to preferably 20 bar, and given

the teachings that the system has pressure drops (example 1), one can infer that the pressure upstream of the mixing apparatus is at least the pressure above the preferred up to 20 bar. Thus, the '297 patent teaches that the pressure above the mixing apparatus and the range would fall within the range recited in the claim 11.

It would have been *prima facie* obvious to one having ordinary skill in the art at the time the invention was made to have a pressure upstream of the mixing apparatus of 3-70 bar because the pressure ranges would be overlapping. According to MPEP 2144.05: In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists. *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976).

Regarding claim 12, 20, the '297 patent teaches "[f]or carrying out the novel process, it may be advantageous to preheat the streams of the reactants prior to mixing, usually to temperatures of from 100 to 600.degree C, preferably from 200 to 500 degrees C. The reaction in the reaction channel usually takes place at from 150 to 600.degrees C, preferably from 250 to 500 degrees C" (column 5, lines 22 to 28).

It would have been *prima facie* obvious to one having ordinary skill in the art at the time the invention was made for the temperature to be with the 80-190 degree range recited because the '297 patent teaches overlapping ranges. According to MPEP 2144.05: In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists. *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976).

Regarding claim 13, the '297 patent teaches "[t]he inert medium is a medium which is present in gaseous form at the reaction temperature and does not react with the starting materials.

For example, nitrogen, noble gases, such as helium or argon, or aromatics, such as chlorobenzene, dichlorobenzene or xylene, may be used" (column 4 to 5, lines 64 to 2).

Claims 1, 8-9, 16-17 are rejected under 35 USC 103(a) as being unpatentable over WO03/045900 ("the '900 publication") in view of United States Patent no. 2822373 ("the '373 patent"). United States Patent no. 7084297 ("the '297 patent") is the English family member of the earlier published WO03/045900 application. The instant rejection is based on WO03/045900 publication, however, for United States Patent No. 7084297 will be used to reference the teachings because it is in the English language.

The teachings of the '297 patent are discussed above are incorporated by reference herein.

The '297 patent fails to teach a regulating device or valve.

Regarding claims 8-9, 16-17, the '373 patent teaches the use of a throttle valve downstream of the mixing apparatus and a valve downstream of the reservoir to give the isocyanate solution (figure 1; throttle valve and valve upstream of isocyanate solution). In addition, the '297 patent teaches the same utility as the '297 patent. Further, the '373 patent teaches a motivation to control the pressure using valves "[t]he solution is then vented through a valve into a reservoir which is maintained at a pressure much lower than that in the line and usually at substantially atmospheric pressure so the hydrogen chloride and excess phosgene is flashed from the solution and carried through the condenser" (column 2, lines 26 to 31).

It would have been *prima facie* obvious to one having ordinary skill in the art at the time the invention was made to combine the teachings of the '297 patent with the teachings of the

'373 patent in order to allow the hydrogen chloride and excess phosgene to pass through work-up stage in order to facilitate the removal of hydrogen chloride. One would expect success in this reaction because the '297 patent is operable with the pressure drop of the system without valves. The valves could be fully opened, or one skilled in the art could facilitate the removal of gaseous products by optimizing the valve settings.

Conclusions

No claims are allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to CLINTON BROOKS whose telephone number is (571)270-7682. The examiner can normally be reached on Monday-Friday 8:00 AM to 5:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, PATRICK NOLAN can be reached on (571)272-0847. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Cab

/Patrick J. Nolan/
Supervisory Patent Examiner, Art Unit 4121